

We claim:

1. A process for polymerizing at least one olefinic monomer in a loop reactor at from 20 to 150°C, but below the melting point of the polymer to be formed, and a pressure of from 5 to 100 bar, where the polymer formed is present in a suspension in a liquid or supercritical suspension medium and this suspension is circulated by means of an axial pump, wherein the polymerization is carried out at an average solids concentration in the reactor of more than 53% by weight, based on the total mass of the contents of the reactor, in the case of continuous product discharge and at an average solids concentration in the reactor of more than 45% by weight, based on the total mass of the contents of the reactor, in the case of discontinuous product discharge, and wherein the polymerization is carried out at an ethylene concentration of at least 10 mol%, based on the suspension medium.
2. A polymerization process as claimed in claim 1, wherein the loop reactor comprises a cyclic reactor tube whose diameter varies by at least 10%, based on the predominant reactor tube diameter, and in which there is at least one widening and narrowing in a region other than that of the axial pump.
3. A process as claimed in claim 1 or 2, wherein there is an additional widening and narrowing of the reactor tube in the region of the axial pump.
4. A process as claimed in any of the preceding claims, wherein the polymerization is carried out at pressure of from 43 to 80 bar.
5. A process as claimed in any of the preceding claims, wherein ethylene is used as monomer and at least one α -olefin having from 3 to 8 carbon atoms is used as comonomer.
6. A process as claimed in any of the preceding claims, wherein at least one olefinic monomer is fed in at at least 2 points along the reactor tube.
7. A process as claimed in any of the preceding claims, wherein the polymer formed is discharged continuously from the reactor.
8. A process for polymerizing at least one olefinic monomer in a loop reactor as claimed in any of the preceding claims, wherein the polymerization in this loop reactor is preceded or followed by at least one further polymerization step in a loop reactor or a gas-phase reactor.